Augmented Reality Drawing Pen

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ENSEEIHT

Introduction

3D designing is the daily of architects, fashion stylists and mechanicians. There are numerous softwares which can be used to design his own 3D models, **such as Blender**, which is free.

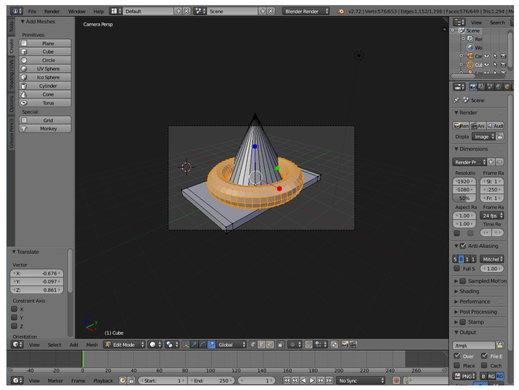

Figure 1: BLENDER's Interface

Actual 3D softwares require a large mathematical background and technical knowledge about the software itself, which **can be a real nightmare** for a neophyte: lots of buttons and unknown features are commun in 3D softwares. In addition, unless knowing **a lot of shortcuts**, finding the right option in the right menu is time consuming.

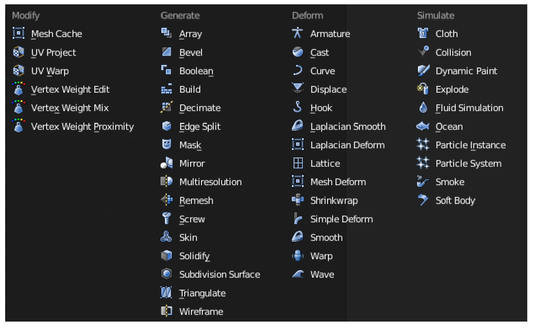

Figure 2: I just wanted to change the view...

For example, changing the views and mastering all the features of a software become intuitive only after a high experience. With more and more jobs that require 3D modeling, **the design of an intuitive 3D modeling software accessible to everyone is required**.

Our approch

As anyone can start drawing in 2D with just a pen, our main idea is to provide **a pen to draw in 3D**. Contrary to a classical pen, this one doesnot require ink and **runs on electricity** with a rechargeable battery.
We use an **augmented reality** device known as **Oculus Rift** to print the 3D model in real time.

Figure 3: a user wearing an Oculus Rift which provides a 3D environment in augmented reality

The provided software links the Oculus Rift technology and the pen together (see Figures 4 and 5). This software :

- is **simple** and **intuitive** to use
- contains **basic features** but also the same **advanced features** as actual 3D softwares, for users who are use to it

The issue of the views

The main feature of the Augmented Reality Drawing Pen lies in the views. Classical 3D modeling softwares like Blender allow the user to move around his model by changing views with the mouse and the keyboard. **The augmented reality system allows the drawer to move around the object** just by moving hisself, **without clicking anywhere**.

As advanced features are avialiable on classical 3D modeling softwares, **the Augmented Reality Drawing Pen also provides more sophisticated features**, well-known by regular users, such as subdivision, scaling, smoothing or duplication.

There are also material, color and texture options to give the model a more realistic render. **There is also a sharing option** that enable several people to work on the same model at the same time. Thus, a complex model, can be achieved quicker.

What the user sees

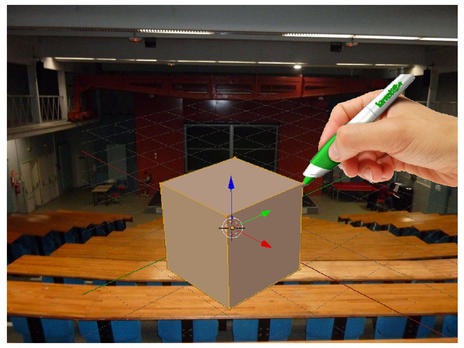

Figure 4: the user click on a vertex of the cube to select it. Here is what he sees to the screen of the Oculus Rift

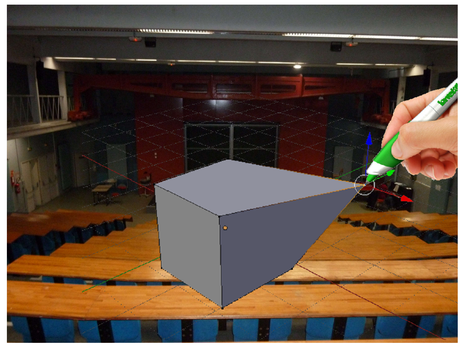

Figure 5: the user moves the vertex further from its initial position : the model adapts to change

Expected Results

We tried to build a simple 3D table model with the already existing 3D modeling software Blender, and then we estimated the time it should last with the Augmented Reality Drawing pen. Figure 6 shows the model of the finished table.

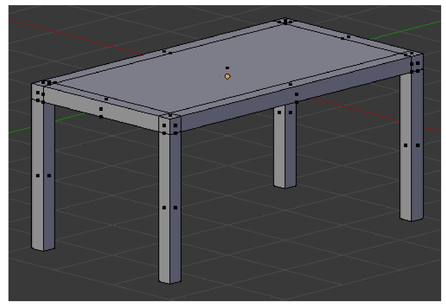

Figure 6: a simple table, easy to modelize with Blender

Support	Duration	Keyboard shortcuts
With Blender	3 to 5 minutes	about 100 (20 different)
With the pen	2 to 3 minutes	0

Conclusion

We presented the major features of Augmented Reality Drawing Pen.

- **Really intuitive**, it allows anyone to start creating in 3D without any precognition
- **Advanced features** that make the model look better are also avialable for skilled users
- The new **sharing option** allows several people to work on the same model

The remaining issue resides in the use of Oculus Rift, which is quite expensive and should not be sold to the general public before the end of 2015.

References

[1] R. Azuma et al.
Recent Advances in Augmented Reality.
IEEE Computer Graphics and Applications, vol. 21, no. 6, Nov./Dec. 2001, pp. 34-37.